The National Retail Federation collects information throughout the year about the holiday spending of American consumers. In early April they report on planned spending by consumers for Mother’s Day. In 2016 consumers planned to spend an average of $172.22 while in 2019 the planned spending per consumer was $196.47.

1. Find the **percent** relative change in planned spending by American consumers for Mother’s Day between 2016 and 2019. Use two significant digits.
2. Find the rate of inflation between 2016 and 2019. Use two significant digits.
3. **Meaningfully** compare the percent increase in planned spending for Mother’s Day **to** the rate of inflation between 2016 and 2019. Use a well-written sentence directed at a general audience (include the term rate of inflation).
4. If the planned spending for Mother’s Day had risen at the rate of inflation what would it have been in 2019?
5. Currently there are approximately 131.8 million American consumers. The 2020 Mother’s Day survey indicates an average expenditure of $204.74 for Mother’s Day. What is the total planned spending for Mother’s Day in 2020? Express your answer to the nearest .1 billion dollars.

In January the Pew Research Center conducted a survey of 3535 American adults to determine their knowledge and attitudes about the 2020 Census. Among the participants, 59% indicated that they knew the Census determines how many representatives a state has in Congress.

1. Describe the components of this Pew Research Center 2020 study below:

Population:

Population parameter:

Sample:

Sample statistic:

* 1. Find the margin of error for this study. Use two significant digits.
  2. Find the 95% confidence interval for the population parameter. Report your interval in a well written contextual sentence. Do not round your interval values.

In January 2010 the Pew Research Center did a similar survey about the 2010 Census, reporting that 64% of American adults knew the Census determined the size of state congressional delegations. It appears the percentage may have decreased. Assuming there has been no change since 2010 the chance of a sample result of 59% in the current survey is .008.

* 1. What are the appropriate null and alternative hypotheses for the 2020 study?
  2. What can you conclude about American adults in 2020? Express your conclusion in a well written contextual sentence for a general audience.

The American Community Survey collects important US population information between census years. In addition to counting the population this data also includes the mean travel time to work for each state. Below, for the Mountain States, you will find data from the 2018 survey.

|  |  |  |
| --- | --- | --- |
| State | Mean Travel Time to Work (minutes) | Population Density  (per square mile) |
| Arizona | 25.5 | 64 |
| Colorado | 26 | 56 |
| Idaho | 21 | 22 |
| Montana | 18.5 | 7 |
| Nevada | 15 | 28 |
| New Mexico | 23 | 17 |
| Utah | 22 | 39 |
| Wyoming | 16 | 6 |

1. Use this data to create a scatterplot **on the graph paper**.
2. Is there correlation in the data? If so, is it a positive or negative correlation? Is the correlation strong, moderate, or weak?
3. Using a well-written sentence, clearly explain any conclusions you can draw about the relationship between these two variables **based on the scatterplot**. Discuss the **variables**, not the graph.
4. In 2018, Wyoming had a population of 577,601. Use the population density of Wyoming to calculate the land area. Round your answer to the nearest thousand.

**Use the “Mean Travel Time to Work (minutes)” data column ONLY to complete parts e) – i) of this problem. You should have 8 data values with which to answer parts e) – i).**

1. Find the Five Number Summary for this data.
2. Draw the boxplot for this data **on the graph paper**.
3. Is this data symmetric, left-skewed, or right-skewed? Explain your choice **based on your boxplot**.
4. **Based on your answer to part g)**, would you expect the mean of this data set to be less than, greater than, or approximately equal to the median?
5. What is the range of this data set?

While being cooped up at home I have decided to create a rectangular flower garden in my front yard to enhance the view for all the people walking around my neighborhood. I installed a wooden frame to enclose the garden. As a home schooling project I had each of my children measure the length of the front side of the frame. My daughter used a measuring tape which reads to the nearest tenth of an inch and got a result of 255.2 inches. My son used an electronic measuring device that measures to the nearest 1/8 inch and got a result of 270 7/8 inches. The true length of the front side is 264 inches.

1. Which measurement is more precise? Justify your answer clearly using quantitative evidence.
2. Which measurement is more accurate? Justify your answer clearly using quantitative evidence.
3. The true width of the frame is 10 feet and the height is 14 inches. What is the true volume of the enclosure rounded to the nearest cubic foot?
4. I am going to fill the frame with high quality soil which I can get delivered in quantities of 5 cubic yards for $214. Unfortunately, the soil is pre-packaged so the only available size is a container holding 5 cubic yards. How much will I have to pay to get enough soil to fill my garden frame?

The test for a certain disease is 86% accurate. A hospital tests a sample of 5000 patients for this disease and the incidence rate of the disease is 12%.

1. Fill in the following table showing the results of this disease testing.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Disease | No Disease | Total |
| Test Positive |  |  |  |
| Test Negative |  |  |  |
| Total |  |  |  |

1. What **percent** of these patients tests positive? Round to the nearest 0.1%.
2. If a patient tests negative, what is the **percent** chance they have the disease? Round to the nearest 0.1%
3. Suppose you select a patient at random **from this sample**, what is the **probability** the patient has the disease **or** tests positive? Use three significant digits.
4. What is the **probability** that two patients randomly chosen **from this sample** who do not have the disease **both** test positive? Use four significant digits.

**Recall that the test for this disease is 86% accurate, for probabilities use 3 significant digits**:

1. What is the **probability** of at least one wrong result in 4 **future** uses of the test?
2. What is the **probability** that the **next three** uses of the test give the wrong result? Put your answer in scientific notation.
3. What are the **odds** the next result is correct?